



North of Dredge Island Enhanced Natural Recovery

Remedial Design Report

Alcoa (Point Comfort) / Lavaca Bay Superfund Site

September 2003



APPENDIX C

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1.0 INTRODUCTION

This Remedial Design Report (RDR) presents the design of the thin-layer cap of beneficially re-used dredge material to enhance natural recovery (ENR) of the general area north of Dredge Island at the Alcoa (Point Comfort)/Lavaca Bay Superfund Site located in Point Comfort, Texas (see Figure 1). The targeted cap boundary is presented in Figure 2, although the actual capped area may extend slightly outside this boundary due to the cap placement technique. Alcoa will place sufficient cap material such that at a minimum the boundary depicted in Figure 2 is capped with a thin layer of clean material. This remedial action is part of the comprehensive Site remedy as described in the Record of Decision (EPA, 2001) and this report is one of several RDRs which collectively provide remedial design for the Site as attachments to the Consent Decree Statement of Work (SOW).

1.1 PURPOSE AND SCOPE

This RDR presents the design tasks required to place a thin-layer of beneficially re-used dredge material in a generally defined area of Lavaca Bay north of Dredge Island. The primary objectives of this RDR are:

- Provide design requirements for the thin-layer capping;
- Provide design requirements and site and construction considerations for the beneficial re-use of dredge material to cap the area;
- Describe how the remedial action will achieve required performance standards;
- Identify critical paths; and
- Identify the final design work that will be required for remedial implementation.

1.2 SITE DESCRIPTION

The Alcoa/Point Comfort Operations (PCO) Plant is located in Calhoun County, Texas, adjacent to Lavaca Bay (see Figure 1). The general area to be capped is located in a small embayment north of Dredge Island and south and east of the Highway 35 causeway. This area has

locations with elevated mercury concentrations in the surface and shallow subsurface sediments that could potentially act as a source of mercury.

The ENR area north of Dredge Island is depicted in Figure 2 and is located near a delineated oyster reef. The area is a shallow water environment, with a bottom elevation of approximately -1 ft Mean Low Tide (MLT), with some areas that extend to -2 ft MLT.

Sediment samples for both chemical and physical analyses have been collected in and around the area, and the contaminant of concern (COC) for this area is mercury. Sediments in this area are similar to those in other areas of Lavaca Bay, consisting of a lean clay on the surface and a fat clay with sand underneath.

1.3 REMEDY OVERVIEW AND REMEDIAL DESIGN STRUCTURE

This remedial action will enhance the natural recovery process that is currently occurring within the Bay. As it becomes available via a maintenance dredge event, a thin layer of beneficially re-used clean dredged material will be placed in a thin layer in the area, which will help reduce surface mercury concentrations and the potential for lateral movement of elevated mercury concentrations throughout the Bay. The cap will be designed with a final elevation intended to help prevent the creation of a habitat-sensitive marsh area.

Thin-layer capping of the area north of Dredge Island is a component of the Bay System remedy, which also includes dredging the Witco Channel, dredging the Witco marsh, installing a sheet pile containment wall and DNAPL collection trench near the former Witco Tank Farm area, stabilizing Dredge Island, minimizing groundwater discharge to the bay from the former CAPA, and removing CAPA sediment (Figure 1).

1.4 PERFORMANCE OBJECTIVES AND STANDARDS

The performance objective of this remedial action is to enhance the natural recovery process currently occurring in the Bay and reduce the surface sediment concentration in the area north of Dredge Island by placing a thin layer of clean material over the sediment surface. The performance standard for this objective will be to place a thin-layer cap of clean material while

preventing the creation of a marsh. Therefore, the final elevation of the capped area will be below - 0.5 ft MLT.

1.5 SUMMARY OF FACTORS AFFECTING REMEDIAL DESIGN

During cap placement, a turbidity plume will likely be created due to the anticipated high percentage of fines in the re-used dredge material. The nearby oyster reef (see Figure 2) will be cordoned off with suitable material such as filter fabric to prevent the accumulation of material in this area during cap construction.

The ENR thin-layer cap may be constructed with beneficially re-used dredge material. Dredge material will be reused provided that a dredge operation occurs within proximity of the ENR area, and the quantity and quality of the material is sufficient. The reused dredge material will have mercury concentrations less than 0.25 mg/kg, as composited across the dredge prism.

Four potential dredge projects and corresponding potential sources of beneficial re-use capping material have been identified: the Alcoa Industrial Channel, the Calhoun County Navigation District (CCND) Channel, the Matagorda Channel, and the Highway 35 Causeway. The maintenance dredge materials from the channels are expected to be similar in grain size to the existing sediment in the area north of Dredge Island (i.e. a silty clay with a high percentage of fines). New work dredging in the CCND Channel or the Highway 35 Causeway may introduce clay balls, shells, and sand. These materials would be suitable for thin-layer capping provided that the discharge barge is moved to avoid localized mounding. Alcoa may also use acceptable material from other construction and development activities.

Maintenance dredge schedules will help to identify whether a potential dredge project may provide capping material for this remedial action. The timing of these maintenance dredge events is uncertain, although they tend to occur over a two to four year interval. Sediment sampling and analysis will be conducted to confirm that the target maintenance dredge material is suitably clean to be re-used as cap material. It is not anticipated that any additional site data will be required prior to final design.

2.0 REMEDIAL DESIGN

This section discusses the design for the thin-layer capping remedial action for the area north of Dredge Island. The capping is one component of the Preferred Alternative (Alcoa, 2001) and EPA's Final Remedy (EPA, 2000) for the Bay System.

2.1 LOCATION AND EXTENT OF REMEDIAL AREA

The areal extent of this remedial design includes the area north of Dredge Island and is depicted in Figure 2. The actual area to be capped may be slightly larger than that depicted in Figure 2, due in part to cap placement technique (broadcast spreading) and in part due to the size of the maintenance dredge project that will supply the clean material. The typical thickness of the cap will range from 0.5 to 1.0 ft thick, with areas near the boundary typically around 0.5 ft in thickness. To prevent the formation of a marsh area, the final elevation of the capped area will not be above -0.5 ft MLW.

2.2 CAP DESIGN

Sediment samples have been collected within the area north of Dredge Island to characterize the COC surface sediment concentrations. The thin-layer cap has been designed to enhance the natural recovery process that is occurring within the Bay in general. Typically, 0.5 to 1.0 feet of clean dredge material will be placed in the area, while ensuring that the final top-of-cap elevation will remain at or below -0.5 ft MLT.

The area for ENR has been delineated to exclude the nearby oyster reef. An approximate 50 ft buffer has been allowed between the delineated oyster reef and the thin-layer capping area. Table 1 lists the sediment samples that have been collected in the project area and the sediment chemistry results. Figure 3 shows the mercury concentrations in surface sediments.

TABLE 1. TOTAL MERCURY RESULTS FOR SAMPLES COLLECTED IN THE PROJECT AREA.

Sediment Depth (cm)		Total Mercury (mg/kg dry weight)		Sediment Depth (cm)		Total Mercury (mg/kg dry weight)		Sediment Depth (cm)		Total Mercury (mg/kg dry weight)	
LVB0804				LVB5507				ST00160			
0	1	0.52	1996-04-22	0	5	0.20	1997-06-23	0	2	0.02	1996-01-24
1	3	0.45	1996-04-22					0	5	0.55	1996-07-15
3	5	0.86	1996-04-22			LVB5522		5	30	3.17	1996-07-15
0	1	0.60	1996-04-22	0	5	0.90	1997-06-30	30	50	0.12	1996-07-15
1	3	0.54	1996-04-22					50	70	0.05	1996-07-15
3	5	1.44	1996-04-22			LVB5523					
5	7	1.23	1996-04-22	0	5	0.43	1997-06-30			ST00191	
10	12	0.95	1996-04-22					0	2	0.32	1995-12-05
0	1	0.33	1996-04-22			LVB5524		0	5	0.31	1996-06-18
1	3	0.61	1996-04-22	0	5	0.54	1997-07-10				
3	5	0.60	1996-04-22							ST00193	
0	1	0.40	1996-04-22			LVB5536		0	2	0.23	1995-12-05
1	3	0.57	1996-04-22	0	5	0.57	1997-07-30	0	5	0.90	1996-06-18
3	5	0.97	1996-04-22								
0	10	0.69	1996-04-22			LVB5543				ST00202	
10	20	0.99	1996-04-22	0	5	1.16	1997-06-25	0	2	0.38	1995-12-08
20	30	0.63	1996-04-22								
30	40	0.04	1996-04-22			LVB5544				ST00203	
40	50	0.06	1996-04-22	0	5	0.93	1997-07-14	0	2	0.42	1995-12-05
50	60	0.02	1996-04-22					0	5	1.11	J 1996-07-09
60	70	0.01	1996-04-22			LVB5545		5	30	0.70	J 1996-07-09
70	80	0.01	1996-04-22	0	5	0.53	1997-07-14	30	50	0.07	J 1996-07-09
80	87	0.01	1996-04-22					50	70	0.03	1996-07-09
										ST00204	
								0	2	0.24	1995-12-05
										ST00205	
								0	2	0.24	1995-12-05

Note: See Figure 2 for sample locations.

Approximately 75,000 to 145,000 cubic yards (CY) of clean dredge material will be used to cap the area north of Dredge Island. This estimate is based on a uniform cap thickness of 0.5 to 1.0 ft over the area to be capped. The dredge volume estimates for the aforementioned dredge projects are expected to be sufficient for the cap volume.

2.3 CAP PLACEMENT

The capping remedial action can be scheduled to coincide with a nearby maintenance or new work dredge project to beneficially re-use dredge material as a capping source. Dredging would likely be done hydraulically with the slurry pumped to a discharge barge. The discharge barge would be constructed or outfitted with a GPS for location control, a diffuser box to dissipate the energy of the slurry, and a mechanism to control the movement of the discharge barge.

Depending on the location of the capping source material, a booster pump may be required on the discharge line. In addition to the booster pump, the discharge line would be outfitted with a Y-valve to enable the routing of the slurry between the disposal area and the discharge barge located at the capping site. In the event that the discharge barge were to undergo downtime (e.g., related to winch malfunction, anchor failure, grounding), the slurry could be routed to the disposal area (such as the Dredge Island disposal area or other area) in lieu of the disposal barge at the capping area.

During cap placement, monitoring will be conducted to evaluate total suspended solids (TSS) effects on the nearby oyster reef (see Figure 2). As an additional measure to protect the nearby oyster reef, a suitable material such as filter fabric will be used to isolate the oyster reef during the cap placement activities. It is anticipated that construction activities will result in a turbidity plume and that clean cap material may be transported outside of the capping area. Coring will be done to verify the presence of a clean cap that is not entrained with mercury-contaminated sediment. Ten cores will be collected from the new capped area for confirmation sampling. These stations will be evenly spaced across the capped area, and the cores will be 2-feet in length. The cores will be sectioned into 6-inch increments, and each increment composited for a total four composites per core sample (40 total samples). If visual observations of the cores indicate a clear horizon between the native material and cap material at an interval other than the planned 6-inch section, then a field judgment will be made to modify the approach and section the core at the horizon. In either case, four composites will be analyzed for total mercury for each core sample. Since contaminated material will not be removed or actively disturbed during cap placement, water quality monitoring for chemical parameters (i.e. mercury) during cap construction is not necessary for this remedial action.

3.0 REMEDIAL ACTION CONSIDERATIONS

3.1 SCHEDULE

The capping project may be scheduled and completed in conjunction with a maintenance dredge project in the area. Based on estimates for cutterhead dredge production (20-inch dredge at 250 to 350 CY/hr), the thin-layer capping project will take approximately one to two months to complete, assuming a 24-hour work day, reduced efficiency for downtime (70 percent), and repositioning of the disposal barge (70 percent). Capping placement is assumed to occur over the same workday schedule as dredging.

3.2 HEALTH AND SAFETY AND MONITORING

All site personnel will be required to conduct site activities in accordance with a Site Health and Safety Plan. Minimum exposure to COCs are anticipated during cap placement, however all site contractors will be required to provide a Health and Safety Plan for all relevant personnel.

3.3 REPORTING REQUIREMENTS

All remedial construction activities will be documented as required to ensure compliance with the construction plans and specifications. Such documentation will be detailed in the Construction Quality Assurance (QA) Plan. Monthly construction progress reports will be prepared during the remedial construction to summarize the progress during each monthly period.

Upon completion of the ENR remedial activities for the area north of Dredge Island, a Construction Completion Report will be prepared for all Bay-Side remedial actions at the Site. This report will include descriptions of the remedial activities, all necessary field records and as-built drawings, as necessary. This report will include a description of the project organization, the construction sequence, equipment and personnel used during remedial activities, a description of design changes/field changes/change orders, a summary of all Quality Assurance/Quality Control (QA/QC) testing, surveying, and final project quantities. This report

will include documentation of the post-capping bathymetric surveys to document the cap thickness, and a volume estimate for the quantity of cap material that has been placed. A summary of monitoring data obtained during construction will be included as well as a description of the remedial action reporting records. All required field documentation, such as daily construction logs, QA/QC data, field or design changes during construction, material submittals and approvals, and monitoring records during construction will be appended to the report.

4.0 FINAL DESIGN AND OTHER WORK REQUIRED

This section discusses final remedial design investigations, including supplemental sampling, surveying, or other work required, and a general description of final plans and specifications and additional plans that are required.

4.1 PRE-DESIGN INVESTIGATIONS

Once the capping source material has been selected, sediment samples will be collected, as needed, to confirm that the targeted maintenance dredge material is clean and suitable for re-use as capping material. Sufficient samples will be collected to characterize the horizontal extent of the target dredge material. Cores will be advanced to below the target dredge depth (including any overdredge) and intervals will be composited across cores to represent the volume that will be used for the capping material. Samples will be analyzed for the COCs that have been identified for the area that is being dredged.

4.2 FINAL PLANS AND SPECIFICATIONS

Construction specifications, with quality assurance and quality control requirements, will be prepared in standard Construction Specifications Institute (CSI) format. Final design documents, including design criteria, will be presented in the subsequent submittal of a Remedial Action Workplan. These technical construction specifications with QA/QC will be included with standard Alcoa General Provisions of the Construction Contract along with the instruction to bidders and other documents required for construction contract bidding.

4.3 ADDITIONAL PLANS REQUIRED

Additional plans that will be required as part of the overall remedial action include the Construction Health and Safety Plan and the Construction Quality Assurance Plan.

5.0 OPERATION, MAINTENANCE, AND MONITORING

Long-term operation, maintenance, and monitoring of the thin-layer capping remedial action are included in the Operation, Maintenance and Monitoring Plan (OMMP) for Bay Sediments (Alcoa, 2002).

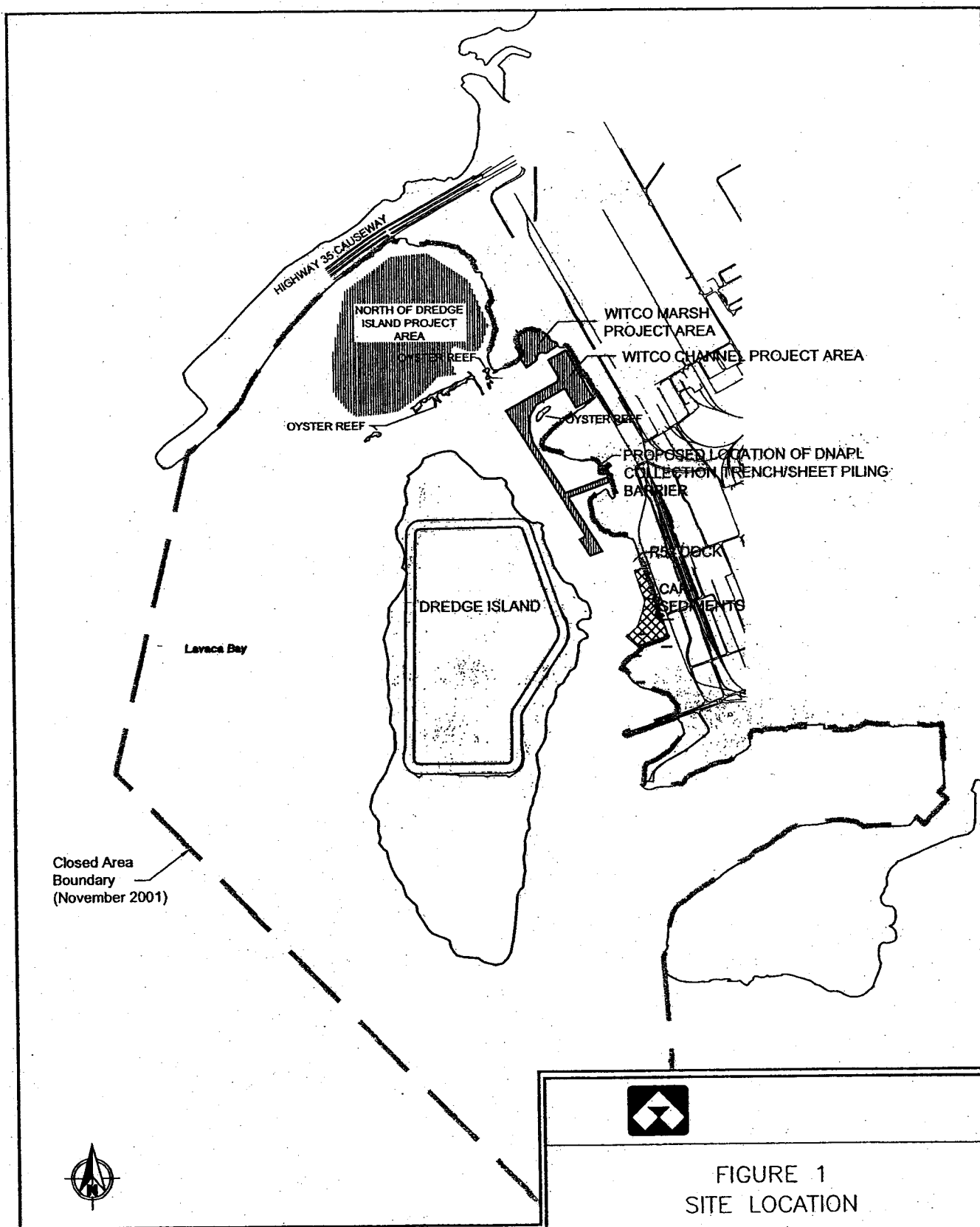
6.0 REFERENCES

Alcoa, 2001. Draft Feasibility Study Alcoa (Point Comfort)/Lavaca Bay Superfund Site, Revision F-3. January 9.

Alcoa, 2002. Operation, Maintenance and Monitoring Plan for Bay Sediments. January.

EPA, 2000. Alcoa/Lavaca Bay Superfund Site Proposed Plan of Action, Point Comfort, Calhoun County, Texas.

EPA, 2002. Record of Decision Alcoa (Point Comfort)/ Lavaca Bay Site, Point Comfort Texas, CERCLIS #TXD 008123168, United States Environmental Protection Agency Region 6 Superfund Division. December.



0 2000
 Scale in Feet

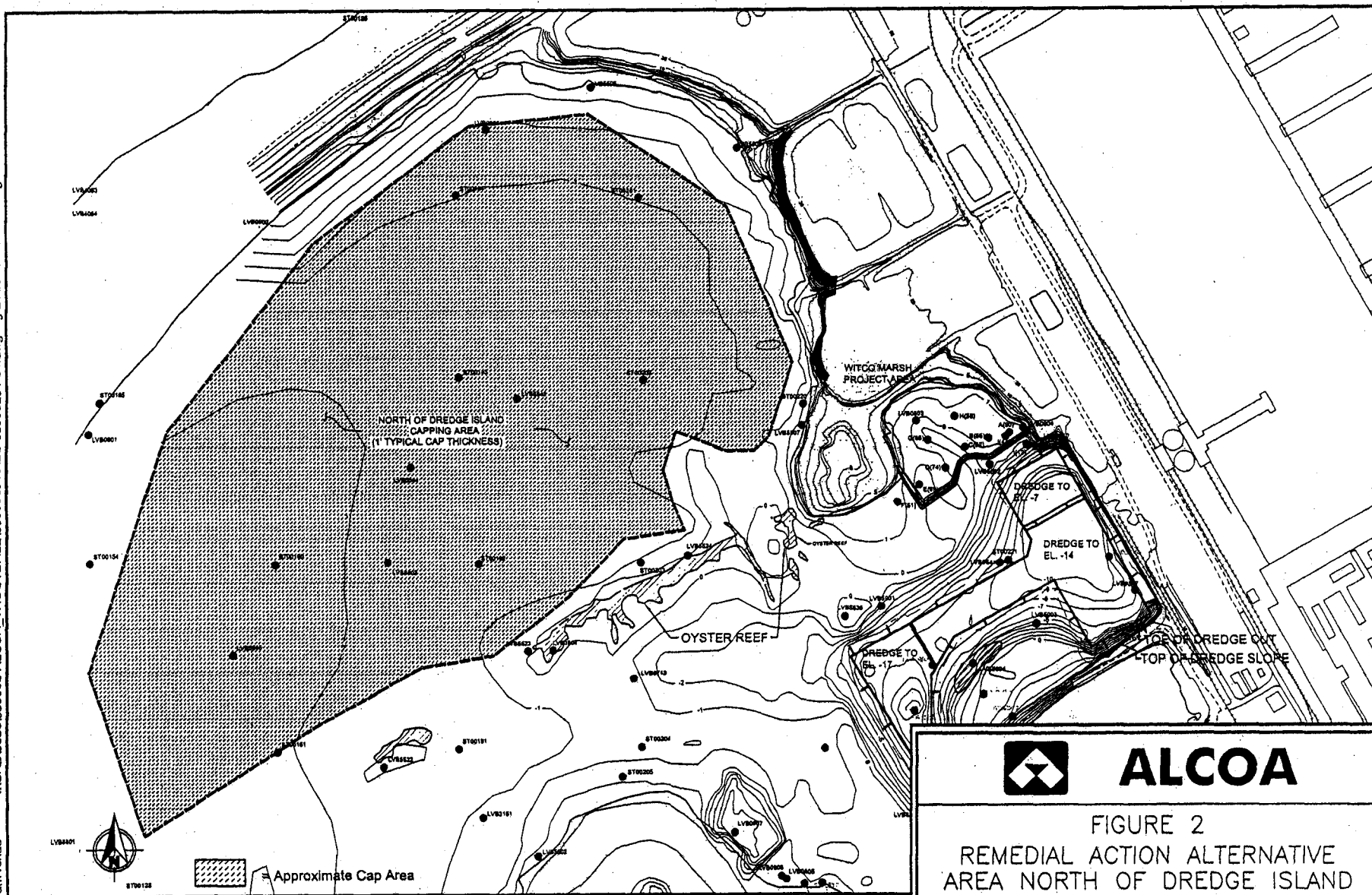
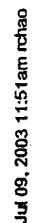
4/11/02 ALC-02000202-03.dwg RC



FIGURE 1
 SITE LOCATION

PROJECT: 02-0002-02	DATE: APRIL 2002
REV:	BY: RC CHECKED: TS

ALCOA
 Point Comfort Operations



NOTE:

- 1) Topographic and bathymetric contours are based on available survey information and are not suitable for construction.
- 2) Elevations shown are referenced to Mean Low Tide (MLT).



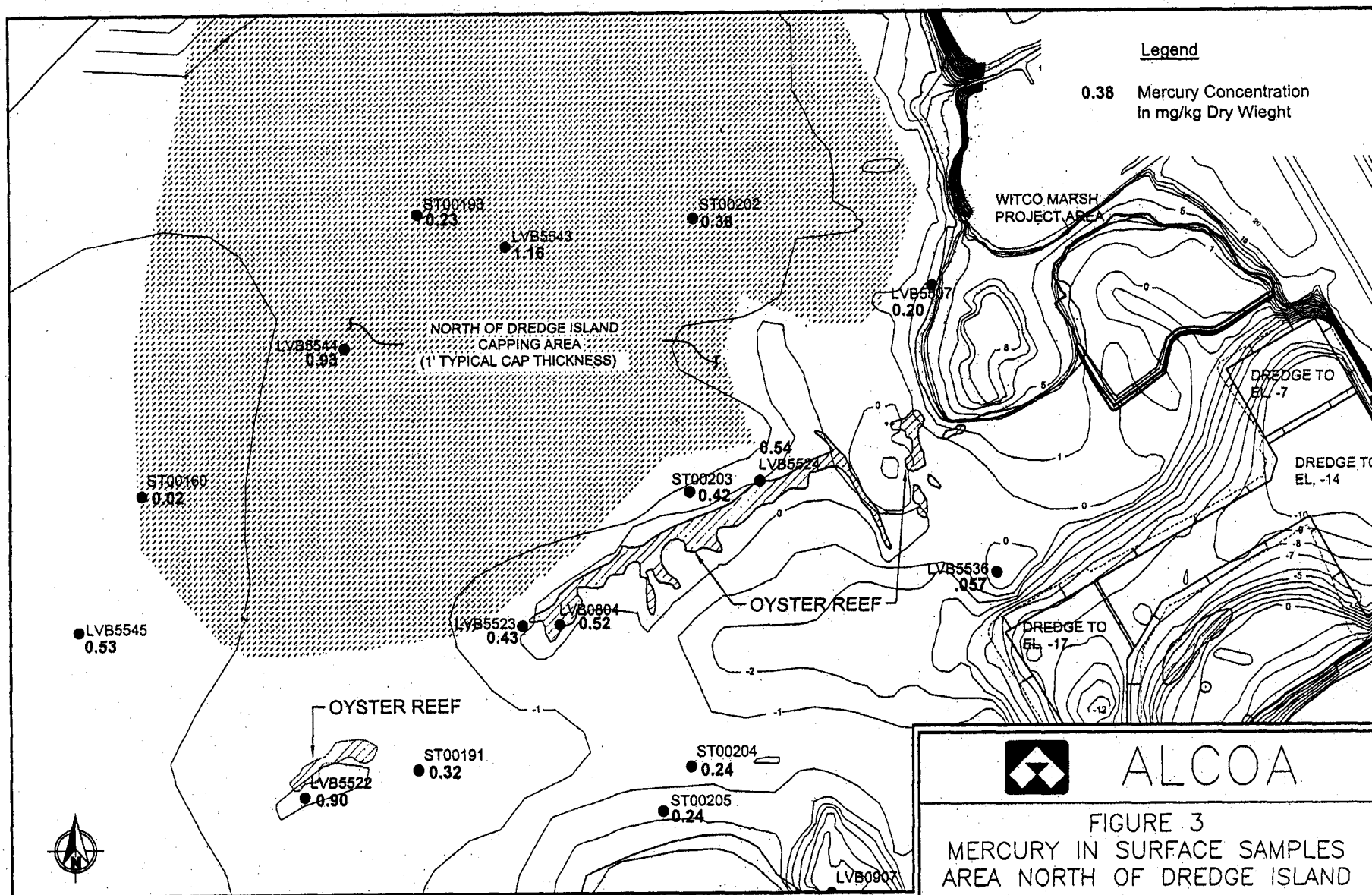
ALCOA

FIGURE 2
REMEDIAL ACTION ALTERNATIVE
AREA NORTH OF DREDGE ISLAND

PROJECT: 03-0002-04	DATE: JULY 2003
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REV:	BY: SD	CHECKED: JV
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ALCOA
Point Comfort Operations



0 400
Scale in Feet

10/10/02 ALC-02000202-01.dwg SJD

NOTE:

- 1) Topographic and bathymetric contours are based on available survey information and are not suitable for construction.
- 2) Elevations shown are referenced to Mean Low Tide (MLT).



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FIGURE 3
MERCURY IN SURFACE SAMPLES
AREA NORTH OF DREDGE ISLAND

PROJECT: 02-0002-02	DATE: OCTOBER 2002
REV:	BY: SD CHECKED: JV

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